

* potentially use tires

- eliminate tire fires, mosquito breeding grounds
- have been shredded, used as fuel, in roads
- need very sturdy mills to cut them up
 - easier to grind if refrigerated
- waste product from Ethanol production - distillation grain
 - HC's get fermented, leave carbohydrates, proteins (10% w)
 - it's fed to cattle - any other uses? pyrolysis?

AIChE Chicago January Meeting

Biomass to Ethanol - an overview

Speaker: Bill Roe, Coskata

- DOE vehicle prediction: internal combustion \rightarrow flex fuel \rightarrow advanced/renewable fuels
- 40-50 yrs required to replace infrastructure
 - biofuels can be the transition fuel
- ethanol represents 6% of gasoline pool
- 18 billion gallon mandated by 2022: \$40 billion sales
equivalent of 10 refineries \$84 billion capex

Biomass \rightarrow Biochemical: enzymatic hydrolysis, fermentation
 \rightarrow Thermochemical: gasification, catalysis

Gasification

NREL pilot plant

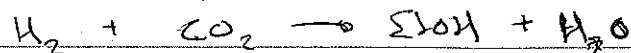
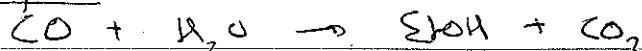
Coskata

Hybrid \rightarrow Gasification + Fermentation

Gasification

→ Variable Feedstocks

Enzymes



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Conversation w/ Bill Roe

- plasma torch gasifier - higher temperature destroys tars, low MW HC - glassy slag formed that is innocuous (can be landfilled / used as filler)
- use for MSW
- biomass much easier
- Hawaii ClearFuels working specific
- Alter ^{NRG}energy in

1/26/09 Group Meeting

- Ruled out coal, wood
- Deciding between MSW, corn cobs

- FINAL DECISION: gasification of MSW to make H_2

Assignments:

Dima - write up

Max - diagram

James - basic

Karina - powerpoint

1/27/09 Group Meeting

- Assembled report and presentation 1

Group Meeting 1 (Class Day 5)

Group Projects:

Alpha: gassy switchgrass to methanol/butanol

*made a wiki space account

- need to consider engines - maybe keep mixed fuel

Foxtrot: biomass to ethanol (cellulosic) via microbial fermentation

- need to consider hemicellulose, lignin

- what about yeasts - different products

- can butanol be thrown in a diesel engine?

Bravo: switchgrass to methanol... via gasification... pyrolysis?

- necessary H_2 : CO?

*Paisley! Taylor processing?

④ ECHO

- Fulcrum Bioenergy

- mining a garbage dump

- an "energy island"

- Hydrogen on west coast - Houston to Baton Rouge

- using n₂

- consider lifecycle

- trash is hand sorted

- too much trash ~~prod~~ - not enough C₁H₄

- mid Sievert for storage

Charlie: prod. of phthalic anhydride from naphthalene or xylene

- look at world demands and costs

*consider utilities

Delta: biodiesel from microalgae

- may have poor cetane #! give to refinery?
- hard to maintain colony from wild algae.
- the clearing downtime

* Gasification process

* conversion in gasification

* call city of Chicago - MSW

* Heat duty of gasifier

* steam + O_2 demand

* mine a landfill - purchasing it?

* set up a wiki (optional) (lock them down)

* basis: take into account gasoline inefficiency

* how far will you take it?

* yields

* email Jeff, Dennis report + ppt

1/28/09 Teleconference Call 2

Scope: - should be capable of all our goals, but don't
HAVE to do them

- might not learn much more with more work

Opportunities: - choose 1 or 2

* air plant

- focus on gasifier or WGS

- H_2 marketable, syngas is ok

* Max will set up wiki

- Gasifier - very hot: 1200 - 1500 psi steam

- detail, conversion

- Basic Engineering Design ^{Questionnaire} ~~data~~: BEDQ

- utilities

- Gasification of coal book (old): Dorer

- Argonne has gasification info - papers

- ^{Pittsburgh} NREL papers

- Plasma? ^{sets} more useful to Jacobs

- Westinghouse plasma jet gasifier - Coskata

- M&E balance: define garbage stream

throw in arsenic, other nasties, mercury

- lpg @ 15 psi to 300 psi - had to remove arsenic

* Do a 5,000 BPD basis

- what is fuel cell car eff vs regular internal comb.

* ΔH for breaking up garbage

... say C₁₂ if necessary

Bubbling / bubling? ... (sp)

Arsenic: 1 lb / million } 2 treaters

Mercury: 10 lb / million }

- UOP is a resource - Jake Gorawa (building D)

* set up greenhouses - CO₂ - or algae

- Four Corners - coal gas - mercury

* Design gasifier + feed by end of week.

- Chicago EPA

- I-90 landfill

- H₂ distribution network

- sodium pellets into H₂O for H₂ ... ?